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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/328,939	06/09/1999	SHUZO FUJIMURA	18867-000410	7514

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EXAMINER
AHMED, SHAMIM

ART UNIT	PAPER NUMBER
1765	

DATE MAILED: 07/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Offic Action Summary	Application N .	Applicant(s)
	09/328,939	FUJIMURA ET AL.
	Examin r	Art Unit
	Shamim Ahmed	1765

-- The MAILING DATE f this communication appears on the c ver sheet with the correspondenc address --

Peri d f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 March 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disp sition of Claims

4)☒ Claim(s) *1,2,5,9-11,21 and 23-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5,9-11,21 and 23-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/24/03 has been entered.

Information Disclosure Statement

2. A part of the information disclosure statement filed 4/12/02 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. The copy of the Japanese patent 75229 is not included herein and also not found in the application NO. 09/268,203. It has been placed in the application file, but the information referred to the Japanese patent has not been considered.

As to the response, Applicants tried to overcome such objections by submitting the U S patent 5,089,441, which is related to the Japanese patent (Kokai-H7-75229) by the attached search report for Dialog.

Examiner does not find any connection with the Japanese patent with the US patent 5,089,441 by reviewing the search report.

By reviewing the search report, it looks like the US patent 5,403,436 is related to the Japanese patent 95075229 but nowhere in the US patent claims relation to the Japanese patent.

Specification

3. The disclosure is objected to because of the following informalities: In the specification page 1, lines 20-23, (which is amended at paper number 9) contains an incorrect phrase such as "U.S. patent No. 5,089,441 appeared to show an ashing method of organic materials, which is carbonized by ion implant, in a hydrogen plasma is which a concentration of atomic hydrogen was increased by adding water vapor into the hydrogen plasma" because, the patent 5089441 does not teach any addition of water vapor into the hydrogen plasma.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 23-29 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The new claim 23 contains the limitation of a

"Gas-B essentially a halogen and a hydrogen bearing species" (see line 5) is not described in the specification. The specification only describes that either a mixed gases of hydrogen and chlorine or hydrogen and HCl can be used to produce the plasma (see page 8, lines 31-page 9, line 6 and examples in pages 12-13).

Therefore, the specification does not support the limitation of gas B could comprise a halogen at least a chlorine, bromine, iodine, or fluorine and a hydrogen bearing species.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1 –2,5, 9 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Moslehi (USP 5,089,441).

Moslehi teaches a dry cleaning process, wherein a gas mixture of hydrogen gas and a halogen containing gas such as HCl or HBr or HF is used to enhance the cleaning process, assuming hydrogen is Gas-A and a Gas-B including a halide (col.7, lines 9-18).

Moslehi teaches that the flow rate of HCl: H2 is less than about 50 sccm:12000 sccm (col.5, lines 15-20).

So, Moslehi teaches the limitation of an amount of hydrogen in gas-B (HCl) to that in gas-A (H_2) is larger than 1/480.

As to claim 2, Moslehi teaches that some of the gases can be introduced in the downstream of the plasma as non-plasma state into the process chamber, assuming Gas-D (col.5, lines 10-20).

As to the claims 9 and 11, Moslehi teaches HF and silane are introduced as a process gas (col.7, lines 10-18 and 54-60).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moslehi in view of Grill (Cold Plasma in Materials Fabrication).

Moslehi discussed in the above paragraph No. 7 but fails to teach the introduction of a gas containing carbon as its element in the downstream of the plasma.

However, Grill discloses an etching process of removing silicon oxide utilizing a gas mixture of hydrogen and CF_4, which is well known in the art (page 230-231 and table 8-2).

Therefore, it would have been obvious to one skill in the art at the time of claimed invention to combine Grill's teaching into Moslehi's method because this is conventional to use a gas containing carbon element as taught by Grill.

10. Claims 1-2, 5 and 23-25 and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi (5,620,559) in view of Lerner et al (5,007,983), and further in view of Hills et al (5,744,049).

Kikuchi discloses a surface treatment process, wherein a gas mixture of hydrogen and water vapor is used to create a plasma, assuming hydrogen is Gas-A and a Gas-B including water vapor (col.3, lines 54-60 and figure 1).

Kikuchi fails to teach that the gas-B comprises a halogen and a hydrogen bearing species.

However, in a plasma etching process, Lerner et al teach that halogen gases such as chlorine or fluorine can be substitute by water vapor because both the halogen gas and the water vapor are functionally equivalent (col.4, lines 57-65).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to include Lerner et al's teaching into Kikuchi's process for substituting the water vapor with chlorine gas because both the chlorine and water vapor are functionally equivalent in a plasma etching process as taught by Lerner et al.

Modified Kikuchi, still does not teach that the gas-B comprises a halogen and a hydrogen bearing species.

However, Hills et al teaches that a hydrogen bearing gas such as HBr can be added to halogen such as chlorine for increasing the etching uniformity of the plasma ion density across the surface of the substrate (col.4, lines 28-35).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Hills et al's teaching into modified Kikuchi's process for

increasing the etching uniformity of the plasma ion density across the surface of the substrate as taught by Hills et al.

Kikuchi also discloses that the ratio of the gas flow of the mixed gas is maintained at a desired value (col.3, lines 65-67).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to optimize the ratio, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

As to claims 2, 24,28, Kikuchi teaches that a gas-D including NF_3 is injected in the downstream of the plasma (col.4, lines 17-26).

11. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi (5,620,559) in view of Lerner et al (5,007,983) as applied to claims 1-2, 5 and 23-25 and 28-29 above, and further in view of Watatani et al (5,620,526).

Modified Kikuchi discussed in the paragraph 10 above, but fails to teach that the gas-D could comprises a gas containing silicon.

However, in a method of cleaning, Watatani et al teach that both the NF_3 and silicon containing gas such as SiH_4 can be used for treatment with enhancing the cleaning capability by removing adhered chemicals onto the substrate (col.3, lines 40-50).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Watatani et al's teaching of functional equivalency of NH_3

and SiH_4 into modified Kikuchi's process for enhancing the cleaning capability by removing adhered chemicals onto the substrate as taught by Watatani et al.

12. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi (5,620,559) in view of Lerner et al (5,007,983) as applied to claims 1-2, 5 and 23-25 and 28-29 above, and further in view of Barth (5,763,326).

Modified Kikuchi discussed in the paragraph 10 above, but fails to teach that the gas-D could comprises a gas containing carbon as an element.

However, in a method of plasma etching process for cleaning semiconductor devices, Barth teaches that NF_3 and carbon containing gas such as CF_4 are functionally equivalent for efficient cleaning (col.2, lines 4-6 and col.3, lines 13-16).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Barth's teaching of functional equivalency of NH_3 and CF_4 into modified Kikuchi's process for efficient cleaning.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (703) 305-1929. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703)-872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Shamim Ahmed
Examiner
Art Unit 1765

SA
July 21, 2003

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